(6 Pages)

Reg. No. : .....

# Code No. : 20437 E Sub. Code : AMPH 11/ CMPH 11

B.Sc. (CBCS) DEGREE EXAMINATION, NOVEMBER 2021.

First Semester

Physics — Core

## PROPERTIES OF MATTER AND MECHANICS

(For those who joined in July 2020 onwards)

Time : Three hours

Maximum : 75 marks

PART A —  $(10 \times 1 = 10 \text{ marks})$ 

Answer ALL questions.

Choose the correct answer :

- 1. Hooke's law relates ———
  - (a) Force and area
  - (b) Length and volume
  - (c) Stress and strain
  - (d) None of the above

- 2. Poisson's ratio is
  - (a) lateral stain/longitudinal strain
  - (b) longitudinal strain/lateral strain
  - (c) lateral stress/longitudinal stress
  - (d) longitudinal stress/lateral stress
- 3. I a beam, the filaments in the upper part suffer \_\_\_\_\_\_ when it is bent.
  - (a) Expansion
  - (b) Compression
  - (c) Expansion or compression
  - (d) None of the above

### 4. The unit of couple is

- (a) Nm (b)  $N/m^2$
- (c)  $Nm^2$  (d) no unit
- 5. When oil is sprayed over stagnant water, its surface tension
  - (a) increases (b) decreases
  - (c) zero (d) none of the above
- 6. The S.I unit for coefficient of viscosity is
  - (a)  $Nm^{-2}$  (b)  $Nm^2$
  - (c)  $Nsm^{-2}$  (d)  $N/sm^{-2}$ 
    - Page 2 Code No. : 20437 E

7.	For	а	sphere,	the	rotational	kinetic	energy	$\mathbf{is}$
———— times the total kinetic energy.								

- (a) 7/2 (b) 2/7
- (c) 5/2 (d) 5/7
- 8. Torque has the same dimension as
  - (a) power (b) work
  - (c) force (d) none of the above
- 9. A pressure of 1 mm of mercury is known as ——
  - (a) One tone (b) One torr
  - (c) One Newton (d) None of the above
- 10. When the density of the liquid is greater, the value of critical velocity
  - (a) increases (b) decreases
  - (c) no change (d) none of the above

PART B —  $(5 \times 5 = 25 \text{ marks})$ 

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Explain Young's modulus and rigidity modulus.

Or

(b) Derive an expression for the period of oscillation of a torsion pendulum.

Page 3 Code No. : 20437 E

12. (a) Obtain an expression for the depression produced at its free end when the weight of the beam is negligible.

#### $\mathbf{Or}$

- (b) Derive an expression for the elevation at the middle of a beam subjected to uniform bending.
- 13. (a) Discuss the variation of viscosity of a liquid with temperature.

#### Or

- (b) Define surface tension, synclastic and anticlastic surface.
- 14. (a) Explain processional motion.

Or

- (b) Derive an expression for power during rotation.
- 15. (a) Explain the laws of floatation.

Or

(b) Describe the energy possessed by a flowing liquid.

Page 4 Code No. : 20437 E [P.T.O] PART C —  $(5 \times 8 = 40 \text{ marks})$ 

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Derive the relation between elastic constants.

Or

- (b) Describe with theory, Searle's method of finding the elastic constants and Poisson's ratio.
- 17. (a) Describe with theory, the oscillation method to determine the Young's modulus for the material of a cantilever.

Or

- (b) Obtain an expression for the couple required to bend a uniform straight metallic strip into an arc of a circle of small curvature.
- (a) Describe in detail about the rise of liquid in a capillary tube.

Or

(b) Determine the coefficient of viscosity by capillary flow method.

Page 5 Code No. : 20437 E

19. (a) Describe the relevant theory, the compound pendulum method of determining the acceleration due to gravity.

 $\mathbf{Or}$ 

- (b) Explain angular momentum and angular impulse.
- 20. (a) Determine the metacentric height of a ship.

Or

(b) Describe the construction and working of a venturimeter and explain its use in determining the quantity of liquid flowing per second through a horizontal pipe.

Page 6 Code No. : 20437 E